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MAYFLIES OF THE SOUTHWEST: NEW RECORDS AND NOTES OF SIPHLONURIDAE (EPHEMEROPTERA)

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A recent study of mayfly collections from Arizona and New Mexico has revealed undescribed nymphs, and new distributional records of the family Siphlonuridae. In the accounts dealing with the species, collections made by the senior author are indicated by the initials RKA, and all specimens are deposited in the California Academy of Sciences, San Francisco.

Genus *Ameletus* Eaton

Ameletus is composed of 31 described species in North America, 25 from western North America and 6 from eastern North America. Western North America is defined as all land area west of the eastern edge of the Rocky Mountains. The distributional range of the genus in western North America is from southern Arizona (32°40′ north latitude) in the MIDDLE NORTH TEMPERATE ZONE to central Alberta (53°31′ north latitude) in the UPPER NORTH TEMPERATE ZONE. In eastern North America the range is from northern Alabama (33°45′ north latitude) in the MIDDLE NORTH TEMPERATE ZONE to southern Quebec (50°19′ north latitude) in the UPPER NORTH TEMPERATE ZONE. *Ameletus falsus* McDunnough, 1938, *A. velox* Dodds, 1923, and three undescribed nymphs are the only *Ameletus* presently known to occur in the Southwest. The nymphs herein treated as *Ameletus* sp. "A," "B," and "C" have not been reared and cannot be associated with described male imagoes and hence the use of informal epithets.

Ameletus falsus McDunnough

Ameletus falsus McDunnough 1938:30.

This species was described from a male imago collected in Arizona.

Type locality.—Greer, Arizona.

Type deposition.—No. 4293, Canadian National Collection, Ottawa, Ontario.

Distribution.—This species is known only from the type locality.

Remarks.—It is probable that one of the unnamed nymphs described below will eventually be found to be the immature stage of this species. All three nymphs have been collected near the type locality of *A. falsus*.

Ameletus velox Dodds

Ameletus velox Dodds 1923:105; Dodds and Hisaw 1924:139; Needham and Christenson 1927:11; Seemann 1927:47, McDunnough 1928:9; McDunnough 1929:174; McDunnough 1934:163; Traver 1935:459; Edmunds 1954:64.

Dodds (1923) described this species from adults and nymphs collected in Colorado. Seemann (1927) reported specimens from southern California, and Needham and Christenson (1927) collected it in Utah. McDunnough (1928) reported it from Alberta, and Edmunds (1954) reported additional specimens from Utah. The nymphal stage is redescribed below.

Nymph.—Length: body 12.0–13.0 mm; caudal filaments 6.0–7.0 mm. General color brown with dark brown markings. Head dark brown, light brown at sutures. Thoracic nota brown with light brown markings; pronotum brown, with light brown midline and sublateral markings; pronotum dark brown anteriorly; mesonotum brown with light brown midline, dark brown anteromedian triangular-shaped macula, and light brown posterior and sublateral markings; metanotum brown with light brown midline; thoracic sterna pale; legs brown. Abdominal terga brown to dark brown with light brown sublateral maculae on terga 1–2; terga 3–8 brown with light brown median diamond-shaped and sublateral markings on each tergum; tergum 9 dark brown with elongate median light brown macula; tergum 10 light brown; abdominal terga with smoky web-like tracheations; abdominal gills pale with numerous dark tracheations; gills 1–7 with subdorsal band one-third from dorsal margin; gills with distinct band on ventral margin; ventral margin gill 4 with 8–9 spines (Fig. 1); abdominal sterna brown, posterior sterna darker; sterna 4–8 with dark brown median macula. Caudal filaments dark brown, light brown basally, without distinct transverse band (Fig. 5).

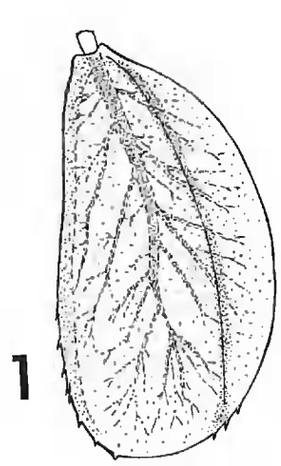
Remarks.—The numph of *A. velox* can be distinguished from all others by the following combination of characters: (1) abdominal gills with distinct dorsal and ventral bands; (2) gills with numerous, dark tracheations (Fig. 1); (3) caudal filaments without a wide transverse band (Fig. 5); (4) ventral margin of gill 4 with 8–9 spines (Fig. 1); (5) abdominal terga with numerous smoky web-like tracheations; and (6) abdominal sterna 4–8 with a median brown macula.

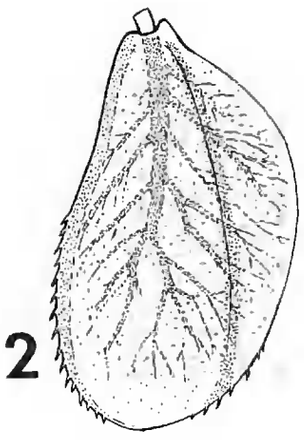
Type locality.—Tolland, Colorado.

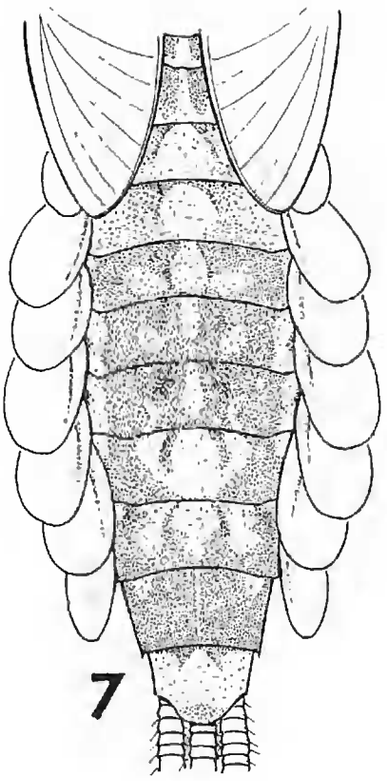
Type deposition.—Unknown.

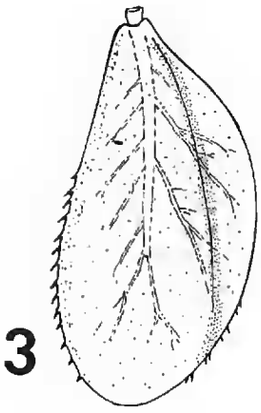
Distribution.—This species has been reported previously from Colorado, Utah, Alberta, and southern California, and this study extends the known range into southern Arizona.

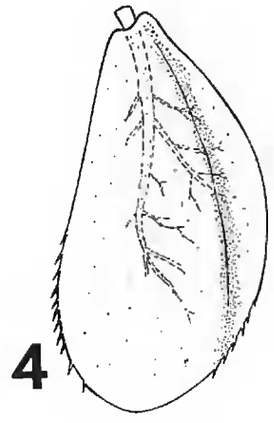
New records.—ARIZONA: *Apache Co.* Stream at Greer, 27-VI-66,

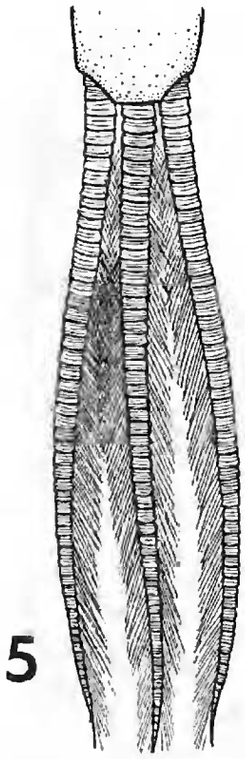


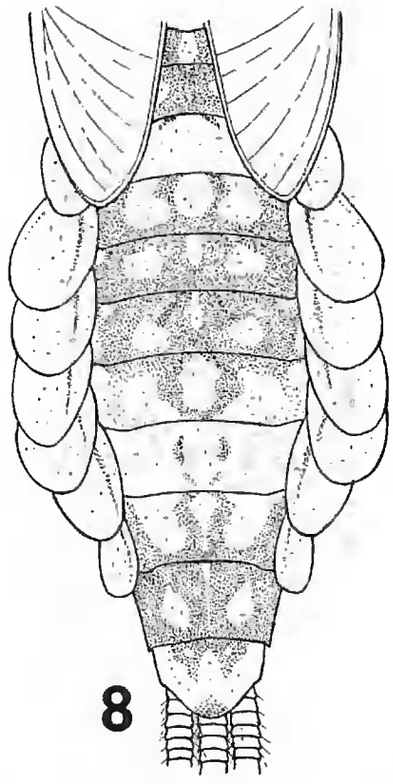












Figs. 1–8. Figs. 1–4. Nymphal gills. Fig. 1. *A. velox*; Fig. 2. *Ameletus* sp. "A"; Fig. 3. *Ameletus* sp. "B"; Fig. 4. *Ameletus* sp. "C." Figs. 5–6. Nymphal caudal filaments. Fig. 5. *A. velox*; Fig. 6. *Ameletus* sp. "A." Figs. 7–8. Nymphal abdomens, dorsal view. Fig. 7. *Ameletus* sp. "B"; Fig. 8. *Ameletus* sp. "C."

RKA. *Graham Co.* Moonshine Cr. on Hwy. 366, Pinaleno Mtns., 20-VII-70, RKA; Wet Cr., Wet Cr. Canyon Camp, Pinaleno Mtns., 20-VII-70, RKA.

Biology.—Nymphs were collected during June and July from streams between 5900–8500 feet elevation, and with a water temperature range between 58°–66°F.

Ameletus sp. "A"

Nymph.—Length: body 12.0–13.0 mm; caudal filaments 5.0–6.0 mm. General color brown to dark brown with light brown markings. Head dark brown, light brown at sutures. Thoracic nota brown with light brown markings; pronotum brown with light brown midline and sublateral markings; mesonotum brown with light brown midline, submedian and sublateral markings; legs brown. Abdominal terga brown with light brown markings; terga 1–3 with light brown median oval-shaped macula; terga 4–5 brown; terga 6–7 with light brown diamond-shaped macula; terga 8–10 with light brown elongate macula; terga with paired submedian light brown spots; abdominal terga with few smoky web-like tracheations; abdominal gills with wide ventral band (Fig. 2); ventral margin gill 4 with 15–16 spines (Fig. 2); abdominal sterna pale, sterna 3–8 with purplish median macula. Caudal filaments pale with distinct dark brown transverse band (Fig. 6).

Remarks.—Ameletus sp. "A" nymph can be distinguished from all others by the following combination of characters; (1) abdominal gills with distinct subdorsal and ventral bands (Fig. 2); (2) gills with numerous dark tracheations; (3) caudal filaments with distinct wide, dark, transverse band (Fig. 6); (4) ventral margin gill 4 with 15–16 spines (Fig. 2); (5) abdominal terga with sparse smoky web-like tracheations; and (6) abdominal sterna 3–8 with median purplish macula.

Distribution.—This species is known only from Arizona.

Records.—ARIZONA: *Apache Co.* Stream at Greer, 27-VI-66, RKA. *Graham Co.* Grant Cr. on Hwy. 366, Pinaleno Mtns., 20-VII-70, RKA; Wet Cr., Wet Cr. Canyon Camp, Pinaleno Mtns., 20-VII-70, RKA.

Biology.—Nymphs were collected during the months of June and July from streams between 5900–8500 feet elevation, and in water with a temperature range between 56°–66°F.

Ameletus sp. "B"

Nymph.—Length: body 10.0–11.0 mm; caudal filaments 3.0–4.0 mm. General color brown with light brown markings. Head brown, light brown at sutures. Thoracic nota brown with indistinct light brown markings; legs brown. Abdominal terga brown; terga 2–8 with light brown median diamond-shaped macula; terga 1–9 with paired light brown sublateral markings (Fig.

7); tergum 10 light brown; abdominal gills with faint ventral band; ventral margin gill 4 with 14–15 spines (Fig. 3); gills with pale tracheations; abdominal sterna 2–8 brown with paired light brown sublateral markings. Caudal filaments pale with distinct wide, dark, transverse band.

Remarks.—*Ameletus* sp. "B" can be distinguished from all others by the following combination of characters: (1) abdominal gills with a faint ventral band; (2) gills with sparse, pale tracheations; (3) ventral margin of gill 4 with 14–15 spines (Fig. 3); (4) caudal filaments with a distinct, wide, dark transverse band; abdominal terga without smoky web-like tracheations (Fig. 7).

Distribution.—This species is known only from New Mexico.

Record.—NEW MEXICO: *Rio Arriba Co.* Canjilon Cr. on Hwy. 110, Carson Nat. For., 29-VI-64, RKA.

Biology.—Nymphs were collected during June from a stream with a water temperature of 66°F.

Ameletus sp. "C"

Nymph.—Length: body 10.0–11.0 mm; caudal filaments 3.0–4.0 mm. General color brown to dark brown with pale markings. Head dark brown, pale at sutures. Thoracic nota pale with brown markings; pronotum pale with pale midline, dark brown sublateral markings, and dark brown at anterior margin; mesonotum brown with pale midline, submedian, and sublateral markings; metanotum brown with pale midline; thoracic sterna pale; legs pale with brown markings. Abdominal tergum 1 brown with paired pale sublateral spots; tergum 2 pale with paired, brown, submedian, oblique markings and brown posterolateral markings; terga 3–6 brown with median pale elongate to diamond-shaped macula and paired pale sublateral and submedian markings; tergum 7 pale with paired brown submedian markings; terga 8–10 brown with pale median markings; tergum 10 usually pale, often with submedian macula (Fig. 8); abdominal gills pale with sparse, pale tracheations; gills with subdorsal band, without ventral band (Fig. 4); ventral margin gill 4 with 11–12 spines; abdominal sterna pale with paired brown anterolateral spots; sterna 7–9 or 8–9 with paired brown, sublateral bands, sternum 9 often with brown inverted U-shaped macula. Caudal filaments pale with distinct, wide, dark brown transverse band.

Remarks.—*Ameletus* sp. "C" can be distinguished from all other nymphs by the following combination of characters: (1) abdominal gills with a subdorsal band only; (2) gills with sparse, pale tracheations; (3) ventral margin gill 4 with 11–12 spines (Fig. 4); (4) caudal filaments with a distinct wide, dark transverse band; and (5) abdominal terga without smoky web-like tracheations (Fig. 8).

Distribution.—This species is known only from Arizona.

Records.—ARIZONA: *Apache Co.* E. Fk. Little Colorado Riv., E. Fk.

Campground, Apache Nat. For., 3-VII-64, RKA; Stream at Greer, 27-VII-66, RKA.

Biology.—Nymphs were collected during June and July from streams between 8500–8700 feet elevation with a water temperature range between 62°–66°F.

Genus *Siphlonurus* Eaton

Siphlonurus is composed of 17 North American species, five of which are found in western North America. The distributional range in western North America is from southern Arizona (31°70′ north latitude) in the MIDDLE NORTH TEMPERATE ZONE to central Alberta (53°31′ north latitude) in the UPPER NORTH TEMPERATE ZONE. In eastern North America the range is from northern Georgia (33°29′ north latitude) in the MIDDLE NORTH TEMPERATE ZONE to northern Ontario (52°15′ north latitude) in the UPPER NORTH TEMPERATE ZONE. *Siphlonurus occidentalis* Eaton, 1885, is the only species in the genus known from the Southwest.

Siphlonurus occidentalis Eaton

Heptagenia brunnea (in part) Hagen 1875:581.

Siphlurus occidentalis Eaton 1885:218 (=*H. brunnea,* in part); Dodds 1923:104; Dodds and Hisaw 1924:138.

Siphlonurus occidentalis, Clemens 1915:248; Ulmer 1920:135; Needham and Christenson 1927:12; McDunnough 1928:9; Traver 1935:473; Spieth 1941:92; Edmunds 1954:64; Allen and Edmunds 1956:85; Edmunds 1960:73; Edmunds and Musser 1960:114; Peters and Edmunds 1961:108; Argyle and Edmunds 1962:181; Edmunds 1962:vii (=*inflatus*).

Siphlurella occidentalis, Bengtsson 1930:10.

Siphlonurus inflatus McDunnough 1931:90; Traver 1935:470.

Hagen (1875) proposed the name *Heptagenia brunnea* based on a male and a female imago from California. Eaton (1885) examined the type material and discovered that the female imago represented a separate species and named it *Siphlurus occidentalis.* Needham and Christenson (1927) reported specimens from Utah, and McDunnough (1928) reported it from Alberta. Bengtsson (1930) discussed the species under the name *Siphlurella occidentalis.* McDunnough (1931) described *S. inflatus* from Alberta and British Columbia, and Edmunds (1962) synonymized it with *S. occidentalis.* Traver (1935) published records from Montana, Washington, Utah, Colorado, Wyoming, Oregon, and New Mexico. Edmunds (1954) reported the species from Utah, and Allen and Edmunds (1956) collected it in Oregon. Edmunds and Musser (1960) cited records from Wyoming and Utah, Peters and Edmunds (1961) from New Mexico; and Argyle and Edmunds (1962) from Colorado.

Spieth (1941) stated that Eaton, in 1885, had other individuals from Washington, Nevada, and "Mt. Hood," he designated a Colorado male imago as the lectotype, and labeled all the other specimens, except the "Mt. Hood" females, as syntypes.

Type locality.—"Colorado."

Type deposition.—McLachlan Museum, British Museum (Natural History), London.

Distribution.—*Siphlonurus occidentalis* is widely distributed in western North America and it is known from every western state in the United States and British Columbia and Alberta in Canada.

New records.—ARIZONA: *Apache Co*. N. Fk. White Riv., Hawley Lake Rd., 27-VI-66, RKA; Stream at Greer, 27-VI-66, RKA. *Coconino Co*. Pond ca. 8 mi. S. Flagstaff. *Cochise Co*. Herb Martyr Lake, Chiricahua Mtns., 28-VI-66, RKA; E. Fk. Turkey Cr., Chiricahua Mtns. 28-VI-66, RKA.

Biology.—Nymphs were collected during June and July from streams and ponds between 5530–8500 feet elevation and a water temperature between 64°–66°F.

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Footnotes

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